

U.S. Patent Application Serial No. 10/009,337  
Reply to Office Action dated August 26, 2004

**Amendments to the Claims:**

This listing of claims will replace all prior versions and listing of claims in the application.

Claims 1-3, 5-7, and 9-11 are amended.

**Listing of Claims:**

1. (Currently Amended) Device for mode-locking laser, in particular a laser of pulsed type, comprising a resonant cavity [(20)],

- delimited by a first mirror [(1)] and a second mirror [(8)],

- provided with an active laser gain medium [(5)] for amplifying a laser radiation beam at the fundamental frequency [( $\omega_1$ )], and

- with a solid non-linear optical means [(10)] which comprises at least said second mirror [(8)], for reversible conversion of the radiation at the fundamental frequency [( $\omega_1$ )] into radiation at a harmonic frequency [( $\omega_2$ )], said non-linear optical means having a reflection coefficient which increases as the intensity of the radiation at the fundamental frequency increases,

said device further comprising ~~arranged in the resonant cavity (20)~~ a solid intensity limiter [(4)], arranged in the resonant cavity, whose transmission coefficient of the laser radiation passively decreases as the intensity of said radiation increases, wherein ~~characterized in that~~ said intensity limiter [(4)] comprises GaAs, CdSe or InP plate.

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2. (Currently Amended) Device according to claim 1, characterized in that the non-linear optical means  $[(10)]$  ~~comprises said second mirror (8) which~~ corresponds to a dichroic mirror and a non-linear crystal  $[(7)]$  able to convert the radiation at the fundamental frequency into radiation at a harmonic frequency.

3. (Currently Amended) Device according to claim 1, characterized in that the non-linear optical means  $[(10)]$  comprises said second mirror  $[(8)]$  which corresponds to a dichroic mirror, a non-linear crystal  $[(7)]$  able to convert the radiation at the fundamental frequency into radiation at a harmonic frequency, and at least one component for polarization selection and/or modification.

4. (Previously Presented) Device according to Claim 2, characterized in that said non-linear crystal is a BBO crystal.

5. (Currently Amended) Device according to one of claim 1, characterized in that the non-linear optical means  $[(10)]$  comprises only the second mirror  $[(8)]$ , wherein said second mirror ~~corresponding~~ corresponds to a Fabry-Perot anti-resonant saturable absorber constructed from a superposition of dielectric or metallic semiconductor films.

6. (Currently Amended) Device according to Claim 1, characterized in that the intensity limiter  $[(4)]$  and the non-linear optical means  $[(10)]$  are placed on either side of the active gain medium  $[(5)]$ .

7. (Currently Amended) Device according to Claim 1, characterized in that the intensity limiter  $[(4)]$  is placed between the non-linear optical means  $[(10)]$  and the active gain medium  $[(5)]$ .

8. (Previously Presented) Device according to Claim 1, characterized in that the active gain medium is an Nd:YAG crystal.

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9. (Currently Amended) Device according to Claim 1, characterized in that the non-linear optical means  $[(10)]$  has a reflection coefficient of the radiation at the second harmonic  $[(\omega 2)]$  which is greater than the reflection coefficient of the radiation at the fundamental frequency  $[(\omega 1)]$ .

10. (Currently Amended) Device for mode-locking a laser, in particular a laser of pulsed type, comprising a resonant cavity  $[(20)]$ ,

- delimited by a first mirror  $[(1)]$  and a second mirror  $[(8)]$ ,

- provided with an active laser gain medium  $[(5)]$  for amplifying a laser radiation beam at the fundamental frequency  $[(\omega 1)]$ , and

- a solid non-linear optical means  $[(10)]$  which comprises at least said second mirror  $[(8)]$ , for reversible conversion of the radiation at the fundamental frequency  $[(\omega 1)]$  into radiation at a harmonic frequency  $[(\omega 2)]$ , said non-linear optical means  $[(10)]$  having a reflection coefficient which increases as the intensity of the radiation at the fundamental frequency increases,

characterized in that said device is provided with an intensity limiter comprising a GaAs, CdSe or InP plate with a transmission coefficient which passively decreases as the intensity of the radiation at the fundamental frequency increases, so as to ensure, in combination with said non-linear optical means  $[(10)]$ , both a positive feedback and a negative feedback on the quality factor of the resonant cavity  $[(20)]$ .

11. (Currently Amended) Process for mode-locking a laser, in particular a laser of pulsed type, characterized in that it comprises:

- emitting a laser radiation beam at the fundamental frequency  $[(\omega 1)]$  by stimulating an active laser medium  $[(5)]$ ,

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- converting the beam at the fundamental frequency  $[(\omega_1)]$  into a beam at a harmonic frequency  $[(\omega_2)]$ ,
- returning the beam at the harmonic frequency  $[(\omega_2)]$  to the resonant cavity  $[(20)]$ ,
- reconverting the beam at the harmonic frequency  $[(\omega_2)]$  into a beam at the fundamental frequency  $[(\omega_1)]$ , and
- passively limiting the intensity of the beam at the fundamental frequency  $[(\omega_1)]$  inside the resonant cavity  $[(20)]$ , by means of at least one GaAs, CdSe or InP plate.